The Bewildering Mystery of Mars

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THE general belief that we are the unique intelligent creatures in existence is in all probability as much of a myth as yesterday's credence which made of the earth the centre of the universe. The fact that, following the discovery of its minuteness by Copernicus and Galileo, man had willy-nilly to accept the reduction of its status to that of a minor planet casts a curious light upon our present reluctance to draw certain obvious deductions from the findings of modern astro-physics. Such an attitude stems, perhaps, not so much from ignorance as from apprehension lest our home-planet be threatened with further dethronement, this causing any theory advocating the co-existence ot other rational beings to be labelled bizarre, when it is not dismissed with scorn.

To be sure, evidence of the co-existence of intelligent creatures somewhere in space is still so meagre as to amount to speculation. Yet, if impartially examined, such a theory emerges as anything but absurd. Thus, for instance, if we reject the orthodox concept of a special creation, the claim of our uniqueness collapses instantly. The cosmos is teeming with heavenly bodies. Admitting that the number of stars is uncountable—as, in fact, it is—the likelihood of potential " earths " is more than possible; it is logical—indeed, it is rational. Our Milky Way alone is scintillating with approximately one hundred billion of them. Stars are suns, mostly with planets—ours with nine being no exception. Granting one lonely planet for each sun, we have one hundred billion planets in our Milky Way alone. Supposing that of these planets only *one* in one million should have some form of life, there would still be one hundred million planets on which bacteria, vegetation, insects, and therefore animals and potentially intelligent creatures, could exist. Even admitting this to be the rarest of occurrences, by reducing any potential " earths " to one for each one thousand million suns their number would still be staggering. Accepting a further ***reductio ad absurdum*** to one single planet for each one hundred billion stars, there would still be thousands—nay, millions—of such planets,

nebulæ immeasurably vaster than our Milky Way, filling space as far as we can imagine. Why should it be impossible for some of such numberless bodies to bear life?

Our sun is merely one of the most insignificant third-degree stars. Yet within its system, besides our earth, we can find other planets where life was, is, or might be possible. Life may not have blossomed simultaneously in all of them. In some it could have already vanished; in others not yet have appeared. The macrocosm, like the microcosm, is subject to the great law of beginning, existence, and end. Hence suns, nebulæ, and perhaps the universe itself, cannot escape the great triple sequence of birth, growth, and death. As life among us has flourished during uncountable periods of time, so equally it may have blossomed in one planet first and in others afterwards; within the bodies of a given nebula following the disintegration of those of another, or before those of a third were even formed.

There are nebulæ in the making, stars which are dying or are being born, now. An infinite variety are in various degrees of growth and decay. All planets evolve parallel with the evolution of their parent-star. The nine of our sun are witness to this. All are at diverse physical stages. Whereas some are solid or semi-solid, others are liquid or even gaseous. Their mass, gravitation, velocity, distance, are as varied as they could be. Hence the possibility of life upon them being proportionately small or great, according to their physical development. Thus, while Pluto is 3,675,000 million miles mean distance from the sun, Mercury is only 36 million miles away; while the latter's volume is only 0·055 that of the earth, that of Jupiter, the giant of the planets, is 1,341 times greater; while the length of Mercury's year is 88 days, that of Pluto is 248·43 years; while the earth has only one satellite, Saturn has no less than ten.

Such factors are the *sine qua non* determining the conditions conducive to the flourishing of life. In our solar system these are, at the present time, hostile to its blossoming, even in its most primitive form. Pluto, Neptune, Uranus, Saturn, and Jupiter—that is, the five which are farthest away from the necessary warmth of the sun—are too cold. Some of the others are too hot. Between these extremes there remain a few which might sustain life—e.g., Venus, similar to the earth in size and mass and perpetually surrounded by dense clouds, the absorbers of much of the sun's heat, might con-

ceivably support life in some form; Mercury, closest to the sun, which, like our moon, shows only one side to the earth, constantly keeping one face turned toward the sun, might also have life. This, in spite of the fact that its "day-light" side is sufficiently hot to melt lead, while its "night" side is correspondingly cold. Between these two extremes, however, there is a twilight belt where it is conceivable that life might have appeared at one time or another, temperatures there being similar to those of the earth.

But it is upon a third planet, strikingly similar to our own, that we should direct our attention. For there some form of life, more than probable, is almost a certainty. Its name: Mars.

Mars, conspicuous for its brilliance, is the next planet beyond the earth and the fourth from the sun, from which its mean distance is 141·5 million miles, compared to our 93 million. Its average distance from us is about 48,600,000 miles, which at times is reduced to 34,600,000. No other planet except Venus comes so near to us. The Martian diameter of 4,200 miles is little more than half that of the earth, but its mass is little more than *a tenth* of that of our globe. Only Mercury, and probably Pluto, are smaller.

The most striking characteristic of Mars is its redness, in contrast to the whiteness of Jupiter. This is an important clue to its condition. The weathering of rocks reddens the earth, particularly where iron is present. The red colour of Mars may be due to its rocks containing iron in a highly oxidized form. It could be that, owing to a quicker evolutionary tempo, its rocks have already devoured most of its oxygen, just as at present those of the earth are slowly devouring ours. There is no redness in the moon, which has never had an atmosphere.

Not all Martian oxygen, however, has vanished. That it still has an atmosphere is demonstrated by the so-called "limb-light"—a narrow, bluish-green band outlining its fully illuminated edge. Calculations and photographs have also proved that Mars, besides having an atmospheric overlayer, has an atmospheric thickness of about 90 km., or 55 miles. In addition to this, water has been identified. Clouds have been photographed. Although some of these are of unknown nature, many of them are aqueous, giving, according to calculations, about 14 mm. of precipitable water.

Furthermore, the thermal radiation of Mars gives proof that its temperature is comparable to that of the earth, while the length of days and years is not dissimilar to ours, the former being twenty-

four hours thirty-seven minutes, and the latter eighty-eight days longer than ours.

With oxygen, water, and temperature, seasonal variations are as definite as terrestrial ones. Their similarity is illustrated by the Martian poles, which wax and wane with the coming and going of the winter in the hemispheres to which they belong, all but vanishing in the summer. The existence of seasons is demonstrated by Martian geography. The ruddy disc of Mars is cut by markings of greenish-blue, which occupy about three-eighths of the Martian area, and by dark patches, named Maria, which are of a permanent character and which were once believed to be sea but are now held to be immense patches of vegetation. Great tracts become green as the summer approaches and the pole whiteness recedes, and turn orangey-brown during the autumn. In the winter the whiteness at the poles begins to appear and to grow, with a corresponding diminution of the greenish hue towards the temperate or equatorial Martian areas. The parallel with the polar caps of the earth is too striking to need emphasis.

With conditions like these it seems absurd to maintain that life could not flourish on Mars, even if only in its most primitive form—e.g., lichens, algæ, or insects. But if so, why not intelligent animals? The earth has produced hers. The physical evolution of Mars is at the same stage at which our planet will find itself when its atmosphere has shrunk. Its oxygen has almost vanished; its waters have become scarce; and its mountains have been wholly flattened.

The possibility of Mars having rational creatures—indeed, highly intelligent beings at present fighting a losing battle for survival against their dying planet—is given weight by another no less remarkable factor. Most of the water on Mars is concentrated at the poles; to a thirsty world each drop would be of the utmost value, as Mars, with very rare aqueous clouds, has neither lakes nor seas. What could be more natural for an intelligent species, dwelling upon a rapidly ageing planet, than to direct the polar waters to the temperate and tropical zones to maintain vegetation and hence life? This would require global irrigation, the probability of the existence of which seems to be supported by the fact that a great number of wisp-like filaments traverse both the bright and the dark areas of Mars, forming a network which wholly enmeshes the planet. These are the famous canals. Their reality is doubted by many;

it is upheld by others. Yet three factors seem to indicate that they could truly be the work of rational beings: (*a*) Mars has dried up; hence the necessity of its scarce polar waters being carefully distributed. (*b*) Such canals, whether an optical illusion or reality, cannot be found on any other planet. And (*c*) they are rectilinear, uniform, and geometrical, characteristics wholly alien to grand-scale nature. As, however, there is no absolute *proof* of their reality, their existence, and consequently that of rational life on Mars, until verified, will have to remain speculations.

But supposing that a phenomenon of extraordinary character, which we can observe with the utmost accuracy, be brought forward, and that this same phenomenon should be explicable only by accepting the theory of the existence of highly evolved rational beings, could we, then, still reject such a theory without doing violence to the impartiality of truly unbiased research?

The conquest of outer space is no longer scientific romance. It is a concrete proposition. The setting-up of space stations, for instance, has passed the blue-print stage and has become feasible. The development of the rocket, the ideal spatial ferry for the transportation of the necessary human and technical material, has made of their erection a comparatively easy task. The velocity of rockets today exceeds 2,933 feet per second, or more than 2,000 miles an hour. At this speed, travelling at a controlled height, they could encircle the earth and return to their starting-point in just over twelve hours. It is an open secret that in recent years more than one missile, having reached outer space, never fell back to the earth. The height at which space stations can be built varies. One such height has been accurately calculated: 1,075 miles. At 1,075 miles our space station would become a true satellite. As such it would behave like the moon, its motive-power being supplied by nature itself in an accurate balance between its velocity and the terrestrial gravitational pull. The moon is fixed in its orbit by precisely these two factors. The speed of an artificial satellite at such a height would be 15,840 miles per hour—i.e., twenty times faster than sound. Such incredible velocity would hardly be noticed, owing to the fact that we, with the earth, are at this very instant spinning round the sun at 66,600 miles an hour. At a height of 1,075 miles the space station could be given an artificial orbit, which would enable it to complete a trip around the world every two hours. In this manner, while it takes the earth a full twenty-four hours to

complete one single revolution upon its axis, our artificial satellite in the same time would make twelve revolutions.

Given well-calculated different heights and orbits, such a man-made satellite could be made to spin round the earth faster or slower until, for instance, it could be retarded to a lunar velocity—i.e., a 29-days orbit. The space station could be controlled not only as regards its height and speed, but also in its direction of rotation. It could be made to rotate from east to west, like our moon, as well as from north to south. Indeed, its man-chosen route could be modified to such an extent that we could make our space station swing ever more towards the west, until eventually it could circle the earth from west to east.

Now, consider the following. Mars, unlike the earth, has not one but two moons. This in itself means nothing. Uranus has five, Saturn ten, and Jupiter eleven. The peculiarity of the Martian satellites lies in something else—namely, in their extraordinary closeness to the surface of their planet. Their mean distance from it is incredibly small when compared, for example, with Phoebe, which is 8,034,000 miles from Saturn; or with Europa, which is 416,000 miles from Jupiter; or, indeed, even with the satellite which is the nearest to its primary, that of Uranus, 80,800 miles distant. Thus, while Deimos is 14,600 miles from the Martian surface, Phobos has the astonishingly low altitude of only 5,800 miles.

The better to appreciate how exceptional this is, it should be remembered that the mean distance of our moon from us is 239,000 miles, or fifty-nine times the radius of the earth. But the distance away of Phobos is less than twice the radius of Mars. A Martian could not see it half-way, the satellite becoming hidden behind the curvature of the planet. This is as if our moon, no matter how far reduced in size, should rotate above our heads at a height of only 5,000 miles.

Deimos's motion of revolution is slower than that of Mars—that is, 30 hours 18 minutes, as against 24 hours 37 minutes. From sunrise to sunrise on Mars would be about one of our days; but between two successive risings of Deimos there would be five and a half days. Like all other celestial bodies, Deimos rises in the east and sets in the west. The truly extraordinary peculiarity, however, concerns Phobos. Phobos rotates so close to the Martian surface that it revolves around the planet *faster* than Mars turns on its axis.

That is not only irregular; it is *unique*. No other celestial body does the same.

Nor is that all. Satellites, in common with all other bodies in space, be they suns or nebulæ, are subject to certain unbreakable cosmic laws, none of which can be violated. Our moon, for instance, needs a whole month to complete her circuit round the earth, while the earth turns on its axis once every twenty-four hours. The result is that, owing to the earth rotating upon its axis, the moon rises in the east and sets in the west. Every night we see the moon thirteen degrees *farther east* than it was the night before, because of its eastward motion round the earth.

But Phobos, breaking all known cosmic rules, becomes responsible for another no less fantastic phenomenon. *It rises in the west and sets in the east*. The result is that, instead of drifting thirteen degrees to the east each day, Phobos travels more than three times around the planet (eastwards), while Mars turns once.

These two unparalleled irregularities cannot be satisfactorily explained by any known law. The closeness of its two satellites to the Martian surface, the disparity in their velocities, and even their smallness—Phobos being ten miles in diameter and Deimos only five—could be attributed to natural causes. But can we assert with equal confidence that the odd behaviour of Phobos, turning three times faster than Mars itself, and, above all, defying all cosmic laws by rotating in reverse, from west to east, is due to the same natural agencies? The two phenomena are inexplicable, unless we consider the only plausible explanation—namely, that they are artificially produced. Such a conclusion implies the presence of highly intelligent, rational beings upon Mars.

The space stations which we are just beginning to consider are a pointer that this is not as fantastic as it might have sounded a short time ago. Within the last five decades not only has man learned to fly; he travels at a speed twice the velocity of sound, has enveloped his planet in radio waves, and has split the atom. Consider his technical strides within the next five hundred years. The technical progress of Mars may have begun ten or one hundred thousand years ago. Why should it be impossible for its inhabitants to have created a global civilization, with its world-wide irrigation system and its space stations?

Yet those who may have built artificial moons may be no more and Mars may truly be a dead planet. Its prodigious canals, those

orderly arteries of the Martian plains, its bewildering satellites rotating with deadly precision across its silent skies, by now may have become but the mute witnesses of a stupendous civilization, built by creatures who, having risen from the brutes, branded their planet with their genius, declined and vanished.

One day we may discover just that. A lesson in humility. And, more than a lesson, a reminder that life, far from having been encased exclusively within a tiny speck of cosmic dust named Earth, has flourished and will continue to flourish with all its wondrous manifestations, of which man is but one, upon an infinite number of worlds, throbbing like living jewels in the vast immensities of a boundless, unfathomable universe.
